
1 19. A bi-directional optical transport system for passing optical signals,
2 comprising:
3 an optical bus for permitting bi-directional transmission of the optical signals;
4 an electrical-to-optical converter for converting electrical communication signals
5 received from first terminal equipment into optical communication signals;
6 a first passive optical interface device coupled to the optical bus for routing the
7 optical communication signals received from the electrical-to-optical converter onto the
8 optical bus in both directions and for permitting the optical signals traveling along the optical
9 bus to pass by in both directions;
10 a second passive optical interface device coupled to the optical bus for routing the
11 optical communication signals traveling along the bus to an optical-to-electrical converter
12 and for permitting the optical signals traveling along the optical bus to pass by in both
13 directions;
14 a fiber optical amplifier for performing bi-directional amplification of the optical
15 signals; and
16 the optical-to-electrical converter for receiving the optical communication signals
17 from the second passive optical interface device and for converting the optical
18 communication signals into the electrical communication signals, the optical-to-electrical
19 converter for providing the electrical communication signals to second terminal equipment.

1 55. A structure equipped with an optical transport system enabling optical

2 communications over an optical bus, comprising:

3 the structure;

4 the optical bus for permitting bi-directional transmission of the optical signals,

5 wherein the optical bus is contained at least in part within the structure;

6 first terminal equipment located within the structure for generating electrical

7 communication signals;

8 an electrical-to-optical converter located within the structure for converting the

B2 9 electrical communication signals received from the first terminal equipment into optical

10 communication signals;

11 a first passive optical interface device located within the structure and coupled to the

12 optical bus for routing the optical communication signals received from the electrical-to-

13 optical converter onto the optical bus in both directions and for permitting the optical signals

14 traveling along the optical bus to pass by in both directions;

15 a fiber optical amplifier located within the structure for performing bi-directional

16 amplification of the optical signals;

17 a second passive optical interface device located within the structure and coupled to

18 the optical bus for routing the optical communication signals traveling along the bus to an

19 optical-to-electrical converter and for permitting the optical signals traveling along the

20 optical bus to pass by in both directions;

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21 the optical-to-electrical converter for receiving the optical communication signals
22 from the second passive optical interface device and for converting the optical
communication signals into the electrical communication signals; and
second terminal equipment located within the structure for receiving electrical
25 communication signals from the optical-to-electrical converter.

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1 58. A method for transporting optical signals over an optical bus between first and
2 second nodes, comprising:
3 generating electrical communication signals at a first node;
4 converting the electrical communication signals into optical communication signals;
5 passively splitting the optical communication signals into two components;
6 routing the two components of the optical communication signals at a first location
7 along the optical bus and permitting the optical signals already on the optical bus traveling in
8 both directions to be passively routed pass the first location, the routing involving directing
9 the two components of the optical communication signals in opposite directions along the
10 optical bus and combining the two components with any optical signals already on the
11 optical bus;
12 at a second location along the optical bus, passively diverting at least some of the
13 optical signals on the bus traveling in both directions toward a second node, wherein the
14 diverting includes permitting the optical signals traveling in both directions to be passively
15 routed pass the second location;

16 converting the optical signals diverted toward the second node into corresponding
17 electrical signals, with the electrical signals including the electrical communication signals
18 generated at the first node; and
19 amplifying the optical signals traveling in both directions between the first node and
20 the second node, wherein the amplifying is performed passively and is for compensating for
21 at least some of the losses associated with diverting the optical signals toward the second
22 node and for losses associated the optical bus.

1 69. A method of transporting optical signals between nodes, comprising:
2 providing a bi-directional optical bus, the bi-directional optical bus permitting bi-
3 directional communication between any of the nodes;
4 passively diverting at least part of the optical signals traveling along the bus in both
5 directions toward each node;
6 converting electrical signals generated at any of the nodes into converted optical
7 signals;
8 separating the converted optical signals into two components and passively
9 combining the two components of the converted optical signals with the optical signals
10 traveling in both directions along the optical bus, wherein the passively combining involves
11 directing the two components of the converted optical signals in opposite directions along the
12 optical bus;

13 receiving at each node at least part of the optical signals traveling along the optical

14 bus;

15 at the nodes, converting the received optical signals back into corresponding the

16 electrical signals; and

17 providing passive amplification of the optical signals traveling along the optical bus,

18 the passive amplification being bi-directional and compensating at least for some of the

19 losses associated with passively diverting the optical signals to each node and for losses

20 associated with the optical bus;

21 wherein by passively diverting optical signals from the optical bus to each node and

22 by passively combining the two components of converted optical signals from each node

23 onto the optical bus, each node can transmit optical signals to any other node and also

24 receive optical signals from any other node.

1 75. An optical transport system enabling optical communications between

2 terminal equipment, comprising:

3 an optical bus for permitting bi-directional transmission of the optical signals;

4 first terminal equipment for generating electrical communication signals;

5 an electrical-to-optical converter for converting the electrical communication signals

6 received from the first terminal equipment into optical communication signals;

7 a first passive optical interface device coupled to the optical bus at a first location for

8 routing the optical communication signals received from the electrical-to-optical converter

9 onto the optical bus in both directions and for permitting the optical signals traveling along
10 the optical bus to pass by in both directions;

11 a second passive optical interface device coupled to the optical bus at a second
12 location for routing the optical communication signals traveling along the bus to at least one
13 optical-to-electrical converter and for permitting the optical signals traveling along the
14 optical bus to pass by in both directions;

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15 at least one optical-to-electrical converter for receiving the optical communication
16 signals from the second passive optical interface device and for converting the optical
17 communication signals into the electrical communication signals;

18 a plurality of terminal equipment for receiving the electrical communication signals
19 from the at least one optical-to-electrical converter; and

20 a fiber optical amplifier for performing bi-directional amplification of the optical
21 signals;

22 wherein electrical communication signals from first terminal equipment is transmitted
23 over the bi-directional optical bus and can be received by at least one of the plurality of
24 terminal equipment.

1 79. An optical system for communicating with at least one other system over a bi-
2 directional optical bus, comprising:

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3 an optical transmitter for receiving a first set of electrical signals and for producing a
4 first set of optical signals;

5 a passive optical interface device for being coupled to the optical bus for routing the
6 first set of optical signals received from the optical transmitter onto the optical bus in both
7 directions and for permitting optical signals already traveling along the optical bus to pass by
8 in both directions;

B4 9 an optical receiver for receiving a second set of optical signals traveling along the
CMT 10 optical bus from the passive optical interface device and for generating a second set of
11 electrical signals; and

12 a fiber optical amplifier for performing bi-directional amplification of at least one of
13 the first set and second set of optical signals;

14 wherein the optical amplifier is for compensating for at least some of the coupling
15 losses associated with the passive optical interface device.

1 84. A structure equipped with an optical system for communicating with at least
2 one other system over a bi-directional optical bus, comprising:

3 the structure;

B7 4 an optical transmitter contained within the structure for receiving a first set of
5 electrical signals and for producing a first set of optical signals;

6 a passive optical interface device contained within the structure for being coupled to
7 the optical bus for routing the first set of optical signals received from the optical transmitter
8 onto the optical bus in both directions and for permitting optical signals already traveling
9 along the optical bus to pass by in both directions;

10 an optical receiver contained within the structure for receiving a second set of optical
11 signals traveling along the optical bus from the passive optical interface device and for
12 generating a second set of electrical signals; and
13 an optical amplifier contained within the structure for performing bi-directional
14 amplification of at least one of the first set and second set of optical signals;
15 wherein the optical amplifier is for compensating for at least some of the coupling
16 losses associated with the passive optical interface device and for losses associated with the
17 bi-directional optical bus.

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1 85. A method for communicating at a first node with a second node over a bi-
2 directional optical bus, comprising:
3 generating a first set of electrical signals at the first node;
4 converting the first set of electrical signals into a first set of optical signals;
5 passively splitting the first set of optical communication signals into two components;
6 routing the two components of the first set of optical signals along the optical bus and
7 permitting the optical signals already on the optical bus traveling in both directions to be
8 passively routed pass the first node, the routing involving directing the two components of
9 the first set of optical signals in opposite directions along the optical bus and combining the
10 two components with any optical signals already on the optical bus;
11 passively diverting toward the first node, a second set of optical signals which are
12 generated by the second node and which are on the bus traveling in both directions, wherein

- 13 the diverting includes permitting at least some of the optical signals traveling in both
14 directions to be passively routed pass the first node;
15 converting the second set of optical signals into a second set of electrical signals; and
16 amplifying the optical signals traveling in both directions between the first node and
17 the second node, wherein the amplifying is performed passively and is for compensating for
18 at least some of the losses associated with diverting the optical signals toward the first node
19 and for losses associated with routing the optical signals along the optical bus.
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